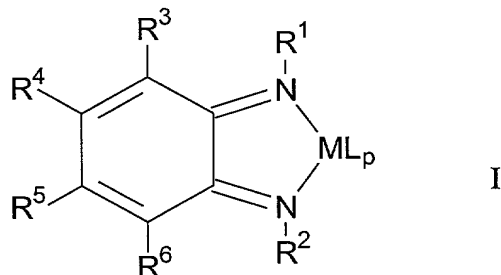


WHAT IS CLAIMED IS:

1. A catalyst comprising a complex having formula I:



where

M is a metal selected from Groups 3 to 10 of the Periodic Table;

R¹ and R² are the same or different and are independently selected from hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl, or C₇₋₁₅ aralkyl, each of these optionally substituted with halogen, cyano, C₁₋₄ alkoxy, or C₁₋₄ alkyl, and with the proviso that not more than 1 of R¹ or R² is a hydrocarbon which is branched at the imino-bonded carbon atom;

R³, R⁴, R⁵, and R⁶ are independently hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl, C₇₋₁₅ aralkyl, C₁₋₁₀ alkoxy, or C₁₋₁₀ dialkylamino, each of these optionally substituted with halogen, cyano, C₁₋₄ alkoxy, or C₁₋₄ alkyl, or wherein any two adjacent R³ through R⁶ form a cyclic structure or are part of a larger ring structure, said cyclic structure and said larger ring structure optionally containing one or more heteroatoms, preferably B, N, O, S, or P;

L is a neutral or charged ligand; and

p is a integer such that complex I is neutral and the valency of M is satisfied.

1 2. The catalyst of claim 1 wherein M is a metal from Groups 8
2 to 10 of the Periodic Table.

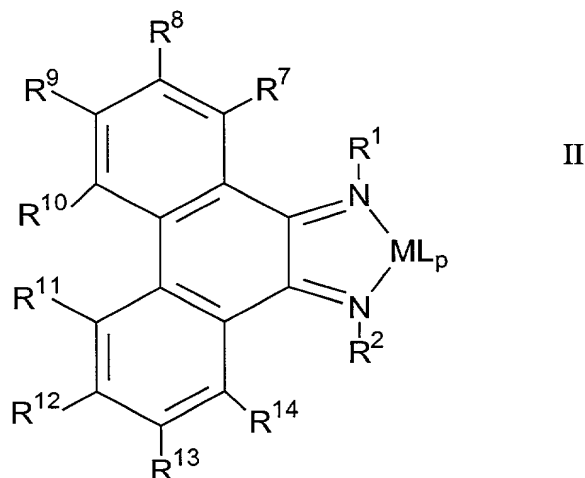
1 3. The catalyst of claim 1 wherein M is selected from the group
2 consisting of nickel, palladium, iron, and cobalt.

1 4. The catalyst of claim 1 wherein L is a charged ligand selected
2 from the group consisting of unsubstituted and substituted cyclopentadienyl,
3 indenyl, fluorenyl, hydride, halide, alkyl, aryl, aralkyl, dialkylamino, siloxy,
4 alkoxy, pyrrolyl, indolyl, carbazoyl, quinolinyl, pyridinyl, azaboroliny, boraaryl,
5 and mixtures thereof.

1 5. The catalyst of claim 1 wherein L is a neutral ligand selected
2 from the group consisting of carbonyl, η^6 -aryl, η^4 -butadiene, η^4 -cyclobutadiene,
3 η^4 -cyclooctatetraene, tertiary phosphine, and mixtures thereof.

1 6. The catalyst of claim 1 wherein R^1 and R^2 are both hydrogen.

1 7. The catalyst of claim 1 having formula II:



3 where

4 M is a metal selected from Groups 3 to 10 of the Periodic
5 Table;

R¹ and R² are the same or different and are independently selected from hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl, or C₇₋₁₅ aralkyl, each of these optionally substituted with halogen, cyano, C₁₋₄ alkoxy, or C₁₋₄ alkyl, and with the proviso that not more than 1 of R¹ or R² is a hydrocarbon which is branched at the imino-bonded carbon atom;
R⁷, R⁸, R⁹, R¹⁰, R¹¹, R¹², R¹³, and R¹⁴ are independently hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl, C₇₋₁₅ aralkyl, C₁₋₁₀ alkoxy, or C₁₋₁₀ dialkylamino, each of these optionally substituted with halogen, cyano, C₁₋₄ alkoxy, or C₁₋₄ alkyl, or wherein any two of R⁷ through R¹⁴, or R¹⁰ and R¹¹ form a cyclic structure or are part of a larger ring structure, said cyclic structure and said larger ring structure optionally containing one or more heteroatoms, preferably B, N, O, S, or P;
L is a neutral or charged ligand; and
p is a integer such that complex I is neutral and the valency of M is satisfied.

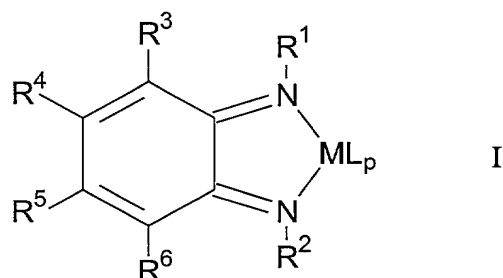
8. The catalyst of claim 1 further comprising an activator.

9. The catalyst of claim 8 wherein the activator is selected from the group consisting of alumoxanes, alkylaluminum compounds, and mixtures thereof.

10. The catalyst of claim 8 wherein the activator is an acid salt containing non-nucleophilic anions.

11. The catalyst of claim 8 wherein the activator is selected from the group consisting of lithium tetrakis(pentafluorophenyl) borate, lithium tetrakis(pentafluorophenyl) aluminate, anilinium tetrakis(pentafluorophenyl) borate, and mixtures thereof.

12. A process for coupling two or more olefins, the process comprising:
- 1) introducing into a reaction vessel an activator and a catalyst of claim 1 having formula I:



where

M is a metal selected from Groups 3 to 10 of the Periodic Table;

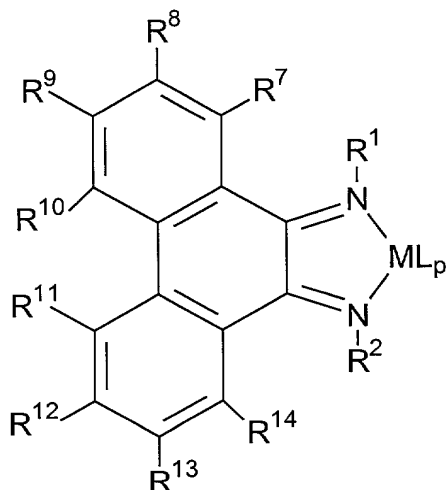
R¹ and R² are the same or different and are independently selected from hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl, or C₇₋₁₅ aralkyl, each of these optionally substituted with halogen, cyano, C₁₋₄ alkoxy, or C₁₋₄ alkyl, and with the proviso that not more than 1 of R¹ or R² is a hydrocarbon which is branched at the imino-bonded carbon atom;

R³, R⁴, R⁵, and R⁶ are independently hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl, C₇₋₁₅ aralkyl, C₁₋₁₀ alkoxy, or C₁₋₁₀ dialkylamino, each of these optionally substituted with halogen, cyano, C₁₋₄ alkoxy, or C₁₋₄ alkyl, or wherein any two adjacent R³ through R⁶ form a cyclic structure or are part of a larger ring structure, said cyclic structure and said larger ring structure optionally containing one or more heteroatoms, preferably B, N, O, S, or P;

L is a neutral or charged ligand; and

p is a integer such that complex I is neutral and the valency of M is satisfied; and

1 20. The process of claim 12 wherein said catalyst has the formula:



where

M is a metal selected from Groups 3 to 10 of the Periodic Table;

R^1 and R^2 are the same or different and are independently selected from hydrogen, C_{1-10} alkyl, C_{6-10} aryl, or C_{7-15} aralkyl, each of these optionally substituted with halogen, cyano, C_{1-4} alkoxy, or C_{1-4} alkyl, and with the proviso that not more than 1 of R^1 or R^2 is a hydrocarbon which is branched at the imino-bonded carbon atom;

R^3 , R^4 , R^5 , and R^6 are independently hydrogen, C_{1-10} alkyl, C_{6-10} aryl, C_{7-15} aralkyl, C_{1-10} alkoxy, or C_{1-10} dialkylamino, each of these optionally substituted with halogen, cyano, C_{1-4} alkoxy, or C_{1-4} alkyl, or wherein any two of R^7 through R^{14} , or R^{10} and R^{11} form a cyclic structure or are part of a larger ring structure, said cyclic structure and said larger ring structure optionally containing one or more heteroatoms, preferably B, N, O, S, or P;

L is a neutral or charged ligand; and

p is a integer such that complex I is neutral and the valency of M is satisfied.